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ASSESSING THE MALAYSIAN SITUATION AND REGULATION READINESS IN THE LIGHT OF THE CONTROVERSIAL GOVERNANCE OF LETHAL AUTONOMOUS WEAPONS (LAWS) INTERNATIONALLY

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Abstract:

The growing use of artificial intelligence (AI) in Lethal Autonomous Weapons (LAWS) and its integration into modern militaries has the potential to revolutionise warfare tactics, enhance military capabilities, and transform future operations. Major powers, such as the United States, China, and Russia, are actively developing LAWS capable of operating independently without human intervention. However, their deployment raises profound ethical concerns regarding accountability, human oversight, and potential violations of international humanitarian law. Although United Nations (UN) Resolution L.56 and subsequently Resolution L.77 were introduced to regulate LAWS, there is no consensus among the international community on this matter. This study aims to shed light on the governance framework of LAWS internationally, provide relevant Malaysian experts' perspectives about this technology and weaponisation, and evaluate the country's readiness in terms of its legislation. To obtain views on the suitability of using LAWS, this qualitative study conducted interviews with representatives from Universiti Pertahanan Nasional Malaysia (UPNM), the Academy of Sciences Malaysia (ASM), the Malaysia Institute of Defence and Security (MIDAS), and a representative from the private sector. Primary data were analysed through a thematic and document analysis of relevant Non-Aligned Movement (NAM) and UN documents. The study found that major powers are actively integrating LAWS, either semi-autonomously or fully autonomously, into military equipment on land, air, or sea. Currently, no binding international legal instrument exists to regulate LAWS. In Malaysia, statutes such as the

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Corrosive and Explosive Substances and Dangerous Weapons Act 1958, Arms Act 1960, and Civil Aviation Regulations 2016 require urgent revision to address this controversial technology and its weaponisation. This study underscores the urgency for Malaysian policymakers to implement proactive legal reforms to prevent the unregulated deployment of LAWS, particularly by private entities. In the long run, the implication is that Malaysia needs to draft a specific law to address LAWS, as this country must be ready to address the controversies of this technology and weaponisation, since the law always has to keep pace with technological development.

Keywords:

Lethal Autonomous Weapons (LAWS), Corrosive and Explosive Substances and Dangerous Weapons Act 1958, Arms Act 1960, Civil Aviation Regulations 2016, Technorealism, Convention on Certain Conventional Weapons (CCW), Artificial Intelligence (AI)

Introduction

The rapid integration of artificial intelligence (AI) and robotics has significant implications for the military, with the potential to revolutionise the nature of warfare, enhance military capabilities, and transform the way future military operations are conducted. The integration of AI and robotics in the military has contributed to the development of lethal autonomous weapons (LAWS), that can identify and select targets, and one that engages with lethal force without human control (Reinhold & Schörnig, 2022, p. 159).

Most global powers, such as the United States (US), Russia, Israel, China, and the United Kingdom (UK), are actively racing to integrate LAWS weapon systems into their defence arsenal due to their ability to support new decision-making processes, act as a force multiplier, and accelerate the action-response cycle on the battlefield. The ability of LAWS to increase reaction time could provide a significant military advantage (Reinhold & Schörnig, 2022, p. 159). Furthermore, a primary advantage of LAWS is the ability of the weapon systems to replace soldiers in high-risk situations. This allows missions to be executed and completed with fewer personnel and less loss of life (Horowitz et al., 2016).

The use of semi-autonomous systems with similar characteristics to LAWS is already widespread, including the US's Patriot missile system, Israel's Guardium, Russia's Platform-M, and China's GJ-series drones (Bartneck et al., 2021; Horowitz et al., 2016; Kania, 2020; Zysk, 2023). Russia is also currently developing its nuclear-powered autonomous underwater vehicle (AUV), known as Poseidon. This weapon system is considered a highly formidable type of LAWS due to its destructive capabilities and autonomous functions (Bartneck et al., 2021; Kania, 2020; Zysk, 2023). The UK is developing a highly classified project named Taranis, an autonomous weapon system (AWS) involving a drone that is often referred to as a flying killer robot (Payne, 2022).

Despite the numerous tactical benefits that come with the use of LAWS, their deployment has raised significant ethical, legal, moral, and humanitarian concerns by experts. The removal of human oversight in fully autonomous systems risks civilian casualties, escalation of armed conflict, the dehumanisation of warfare, and breaches of international humanitarian law (IHL) and human rights (Horowitz, 2019; Renic & Schwarz, 2023). These systems may also

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malfunction or be hacked by adversaries through cyberattacks, creating new threats in already volatile conflict zones (Gaire, 2023). The central ethical dilemma lies in whether machines should be permitted to make life-and-death decisions, particularly when such decisions may lack accountability or moral reasoning.

International organisations such as the United Nations (UN) are addressing concerns about the use of LAWS through the Convention on Certain Conventional Weapons (CCW). A 2024 CCW report emphasises the need for human control, national legal reviews of emerging weapon systems, and interdisciplinary approaches to mitigate risks throughout a weapon's lifecycle. This also encourages transparency, accountability, and cooperation to prevent misuse by non-state actors or rogue states (UN, 2024). The UN also introduced Resolution L.56 to reaffirm that international law, including the UN Charter, international humanitarian law, and human rights law, applies to LAWS; it stresses the need to address the humanitarian, legal, security, and ethical issues associated with these new weapons and technologies (UN, 2023).

The presence of LAWS in Malaysia remains in its early stages, with no clear policies or regulations in place. Constitutional provisions such as Articles 4, 5, and 8 affirm the supremacy of the Federal Constitution (1957), the right to life, and equality before the law. Articles 149 and 121 of Malaysia's Federal Constitution (1957) provide legal mechanisms against subversion and ensure judicial oversight, which could potentially extend to autonomous weapon systems. Additionally, Article 1 of the Federal Constitution (1957), which outlines Malaysia's territorial and administrative boundaries, underscores the risks that LAWS may pose to national sovereignty. Overall, the Federal Constitution, rule of law, and moral principles form a foundational ethical framework that must guide any national discourse on LAWS.

Nonetheless, Malaysia currently lacks a clear regulatory framework or national strategy to address the ethical and legal risks posed by LAWS. The absence of proactive governance places the country at a disadvantage, particularly in safeguarding human rights, ensuring accountability, and aligning with international norms. Incidents involving LAWS in other conflict zones—such as civilian casualties in Gaza in 2023 (Davies et al., 2023) and in North Waziristan, Pakistan, in 2012, where 12 civilians attending a wedding were mistaken for members of the Islamic State (IS) and killed in a drone strike—underscore the urgent need for robust oversight and ethical evaluation (Hashimy, 2023). In the latter case, sensors used in the US AI system detected heat signatures and vehicle clustering, interpreting group movements in remote areas and early-morning departures from compounds as signs of a militant gathering (Hashimy, 2023). As a result of incorrect human interpretation of these sensor signals—mistaking a wedding for a militant meeting—innocent civilians were killed. This incident demonstrates how AWS or semi-autonomous weapon systems, even when managed by humans, can be prone to fatal errors.

Therefore, this study's main aim is to shed light on the governance framework for LAWS internationally, provide relevant Malaysian experts perspective about this technology and evaluate the extent of this country's readiness in terms of its legislation to deal with LAWS. This study provides an overview of LAWS in military technology, ethics, and regulation from a global and Malaysian perspective. It outlines relevant Malaysian experts' views on LAWS regulations and technology, and provides insight into the country's approach to handling this issue responsibly.

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Literature Review

This study presents a literature review grouped into several sections.

Evolution of LAWS in the Military

The integration of AI in defence technology has a significant impact on how modern military operations are conducted. Scholars increasingly acknowledge the transformative capabilities of AI in the military domain, especially with the advent of LAWS, which is anticipated to play a central role in future combat scenarios (Longpre et al., 2022; Saxon, 2022; Scharre, 2018; Wyatt, 2022).

Del-Monte (2018) and Scharre (2018) provide fundamental insights into the development of AI within the military domain. Del-Monte (2018) predicted that autonomous weapons integrated with AI would dominate the battlefield of modern warfare, especially with the use of autonomous drones that are capable of identifying and engaging targets independently. Scharre (2018) analyses in detail the historical precedents of weaponry alongside contemporary advances in AI, such as robotic submarine-hunting ships and autonomous drones, without offering specific operational case studies or an analysis these systems.

Many studies on the use of AI in military domains suggest that LAWS could improve military efficiency and enhance safety on the battlefield (Dahlmann, 2022; Horowitz, 2019; Scharre, 2018; Wyatt, 2022). Horowitz (2019) notes that autonomous systems may reduce risks to human soldiers by operating in high-threat environments and may lower operational costs, increasing the operational speed and efficiency of military operations. Similarly, Longpre et al. (2022) observe that advances in AI and robotics have enabled increasingly autonomous systems, such as AI-guided missiles and surveillance towers. Due to the absence of clear international regulations, military actors are increasingly developing and adopting this technology into their arsenals.

Numerous studies, including Dahlmann (2022), Del-Monte (2018), Saxon (2022), Scharre (2018), and Wyatt (2022), have analysed the technical distinctions and degrees of autonomy in these systems. To understand the degree of autonomy in LAWS, one must be able to distinguish between semi-autonomous and fully autonomous weapons. This has been analysed in detail by Wyatt (2022), who discusses the strategic implications of removing human oversight in the use of LAWS. Saxon (2022) echoes this, emphasising how AI weapon systems can identify and destroy targets, an essential characteristic of LAWS. Dahlmann (2022) concurs, arguing that the speed of autonomous decision making could radically alter the tempo of conflict, although he does not explore which states are currently leading in deployment.

Lele (2019) traces the historical development of LAWS by contextualising the emergence through both technological progression and strategic needs, presenting examples of state-level implementation. However, like every other work, there are certain criticisms that should be addressed. Del-Monte (2018) and Lele (2019) both lack up-to-date analysis, while other authors, such as Dahlmann (2022) and Saxon (2022), fail to provide an in-depth analysis of specific states such as Russia or China that have made strides in developing LAWS thanks to their significant investments in LAWS development.

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To sum up, the literature reviewed in this section reflects a broad agreement on the rising complexity and integration of AI in defence, especially in the context of developing LAWS.

A Review of State Legislations Addressing LAWS

At present, only the US and the UK have publicly accessible national-level policy documents regulating LAWS and military AI. The UK Ministry of Defence (2022) document entitled 'Ambitious, Safe, Responsible: Our Approach to the Delivery of AI-Enabled Capability' and the US Department of Defence (2023) Directive 3000.09 represent rare examples of transparency in this domain. In contrast, other major powers, such as China, Russia, and India, either lack clear legislation or restrict access due to national security. Malaysia currently has no specific guidance and legislation for LAWS, making these two documents potential reference models for future regulatory development.

Directive 3000.09 provides a structured governance framework emphasising human judgement, technical rigour, and AI ethics, such as responsibility and traceability. It introduces institutional oversight through senior reviews and clear accountability structures. However, the Directive's limitations include its minimal ethical engagement with broader moral dilemmas, procedural rigidity in the face of evolving AI warfare, and unclear guidance on software updates and AI retraining. The vague definition of "AI-enabled" also poses enforcement challenges and may cause inconsistency in application.

The UK Ministry of Defence (2022) document similarly balances AI integration with commitments to safety, legality, and ethics. It promotes ethical foresight through principles aligned with international humanitarian law and involves external stakeholders in governance. However, this document falls short on technical clarity, offers vague definitions such as "context-appropriate human involvement", and lacks actionable implementation tools or independent oversight mechanisms. These gaps raise concerns about whether its ethical ambitions can be effectively realised in practice.

Ethical Dilemma of LAWS

The rapid growth of AI-based weapon systems, particularly LAWS, has garnered increasing scholarly attention due to the ethical implications of the development and use of this weapon. Numerous authors, such as Bode and Huelss (2022), Galliot et al. (2021), Hynek and Solovyeva (2022), Kshetri and Miller (2023), Marsili (2023), Nnamdi et al. (2023), Renic and Schwarz (2023), Saxon (2022), and Zaid (2022), have analysed the moral challenges and normative consequences of delegating life-and-death decisions to machines. Galliot et al.'s (2021) edited book provides an exceptional exploration of the moral and legal issues associated with the design, development, and deployment of LAWS. The book provides good examples of ethical and legal considerations, but lacks practical discussion, serving more as a starting point than a conclusive analysis.

In contrast, the work by Bode and Huelss (2022) offers a comprehensive analysis of the normative aspects of the AI revolution in warfare, particularly focusing on LAWS and its impact on the use of force. The authors challenge the sufficiency of traditional international legal frameworks in regulating LAWS and advocate for a deeper understanding of how norms evolve to influence the use of force. Although the authors highlight the important developments in the use of autonomous weapons, they have not explored their potential impact on military strategy.

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Saxon (2022) emphasises the moral erosion of human dignity and international law caused by autonomous weapon systems. In his critical analysis, the author recognises the profound legal and moral consequences of allowing AI to operate without human intervention. However, his work does not delve into the practical challenges of implementing accountability mechanisms for crimes committed with autonomous weapon systems.

Hynek and Solovyeva (2022) provide an in-depth analysis of the potential of AI in military contexts, offering a layered theoretical framework to assess its implications. The important discussions of this work include exploring challenges and dilemmas such as dehumanised killing and the challenges of applying existing legal frameworks to autonomous technologies. Despite these crucial issues, this scholarly work does not delve into the specific technical challenges and limitations of implementing AI in military operations.

Zaid (2022) adds to this discourse by outlining concerns about the potential dangers of relying on AI's uncertain guarantees and lack of accountability in autonomous targeting decisions, and argues that reliance on AI in life-or-death scenarios may breach the principle of distinction under IHL, especially when making a distinction between combatants and civilians. This article provides an analysis but fails to explore the potential long-term societal impacts of the widespread use of LAWS and global security dynamics.

Marsili (2023) discusses the ethical and moral dilemmas emerging from the removal of humans in decision making when utilising autonomous weapons. The author expresses in detail the need to establish legal and ethical guidelines to prevent the dehumanisation of warfare, emphasising the need for responsible governance. Nevertheless, the article does not provide an in-depth analysis of international laws, treaties, or specific ethical standards governing the use of emerging disruptive technologies (EDT).

Renic and Schwarz (2023) raise strong moral concerns, warning that the use of autonomous weapons could lead to a "moral vacuum" where decisions about killing are made by algorithms instead of humans. They argue that this might desensitise soldiers to violence and weaken their sense of right and wrong during war. While the article advocates a critical examination of these ethical risks, it fails to provide a comprehensive discussion of the technical or operational limitations of autonomous weapon systems.

Nnamdi et al. (2023) approach LAWS through the lens of IHL, emphasising the legal and humanitarian risks posed by autonomous systems. This scholarly work makes a strong case for strict regulatory frameworks but does not delve into the technical aspects of LAWS or provide detailed case studies or examples to support its arguments.

Kshetri and Miller (2023) attempt to explore the emergence of autonomous weapon systems and robotic weaponry, focusing on the ethical implications associated with their development and use. The article effectively captures global support for LAWS, including in countries such as the US, Russia, and China. However, its analysis is somewhat unbalanced, as it does not fully explore the potential benefits of autonomous systems in warfare.

There is limited academic research on LAWS from a Malaysian perspective. Hoo (2022) highlights the ethical, legal, and geopolitical risks of LAWS and emphasises Southeast Asia's vulnerability due to political fragility and great power rivalry. She advocates for inclusive

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 7 Issue 23 (December 2025) PP. 37-66
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regional norm building and gender-sensitive peace frameworks. However, the article lacks empirical depth, overgeneralises the region, and offers limited legal analysis. Its proposal for a regional ban is normatively compelling but underdeveloped in terms of feasibility and stakeholder engagement.

In sum, the literature in this section reflects deep ethical concerns over the delegation of life-and-death decisions to machines, particularly regarding accountability, human dignity, and legal compliance.

Regulating Lethal Autonomous Weapons

Due to the ethical implications of LAWS, many scholars and policymakers have raised growing concerns about the regulation of this weapon system. Internationally, there is a pragmatic urgent need for legal and ethical governance. Zieliński (2018) advocates for a preventive ban on the development and use of such systems, stressing that meaningful human control must be maintained in critical decisions. A weakness of this article is that it does not provide a detailed examination of the ethical implications of using autonomous combat systems in warfare.

Cummings (2021) presents a framework for conceptualising the human–computer balance in future autonomous systems, both for military and civilian purposes. The author also raises concerns regarding the technical competence of decision makers in approving the use of autonomous weapons, given the complexity of the probabilistic reasoning involved. However, this work falls short in examining the legal and regulatory frameworks needed to govern such technologies.

Alwardt and Schörnig (2021) argue that the current debate on LAWS needs to combine traditional security-related arguments with ethical and legal concerns. They call for verifiable parameters to define "meaningful human control" and the development of clear guidelines to ensure accountability. However, this work does not address the perspectives of major technology actors who advocate for LAWS as a potential solution to security threats.

Krishnan (2021) proposes ethical governance models to regulate LAWS, including continuous testing and evaluation to avoid unpredictable behaviour. The author insists on human oversight and intervention at all times, but has not provided examples or contemporary studies in support of the argument.

Chrvalová (2022) examines global regulatory efforts through platforms such as the CCW and the Group of Governmental Experts (GGE). The author concludes that further research and data development are needed to support robust international governance. However, this scholarly work does not offer a detailed analysis of specific international legal frameworks.

Christie et al. (2023) explore the challenges of explainability and traceability in regulating lethal autonomous weapon systems such as LAWS. The authors also emphasise the importance of principle-based regulation to address legal and ethical challenges, particularly in ensuring responsible AI use in warfare. This scholarly work, while theoretically strong, lacks empirical case studies to support its claims.

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IJIREV
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Filipovic (2023) states that the lack of global regulations for the research, production, and use of LAWS has led to their increased use in contemporary battlefields, particularly in Libya, Syria, Yemen, Nagorno-Karabakh in Azerbaijan, and Ukraine. While major powers engage in regulatory discussions, these countries do not want to fall behind in the technological arms race. Nonetheless, this author does not thoroughly examine each state's regulatory approach.

Kleczkowska (2023) argues that the degree of human control determines the legal acceptability of LAWS. She stresses the importance of human involvement in the development phase of LAWS to ensure compliance with international law. A major weakness of this article is that it does not consider the perspectives and arguments of critics who support stricter regulations or a complete ban on autonomous weapons.

In sum, the literature reviewed in this section reflects a growing consensus on the need for clear regulations and human oversight in the use of LAWS, with most scholars agreeing to the need for ethical considerations, international cooperation, and integration of legal norms.

Synthesis of the Literature Review

The literature review revealed several important gaps in relation to the research on LAWS, especially from the Malaysian perspective. The main gaps identified are as follows:

1. Within the existing research on LAWS, contributions from Malaysian scholars are still very limited. This leaves a gap in understanding Malaysia's approach, stance, and role on this issue.

2. Currently, there is no specific policy or regulations from the Malaysian government regarding the research, development, or usage of LAWS.

3. Although Malaysia supported UN Resolution L.56 (UN, 2023) regarding ethical concerns over autonomous weapon systems, no clear official stance or long-term strategy has been publicly announced. Therefore, Malaysia's stance on LAWS is still unclear.

4. The technorealism approach, which offers a neutral and balanced view of technology, has not been used in the study of LAWS. In fact, this concept can provide a critical analysis of the limitations and potential of the technology.

This study aims to address these gaps by focusing on the Malaysian context. The analysis of technorealism linked with LAWS also contributes to the area of science and technology studies to highlight the pros and cons of these weapons. It is hoped that this contribution will provide useful guidance to policymakers, academics, and stakeholders.

Methodology

The research design chosen for this study is action research, which provides a dynamic approach to addressing policy issues and ethical dilemmas surrounding LAWS. As noted by Somekh (2006), action research aims to promote social transformation and justice by encouraging ethical and politically informed actions. Drawing from disciplines such as psychology, philosophy, and sociology, this approach supports interdisciplinary engagement to apply knowledge effectively (Somekh, 2006).

This study employs action research to explore Malaysian experts' views and positions on the ethical dilemmas arising from the introduction and use of LAWS and to make necessary recommendations for changes in policy and laws. By involving multiple stakeholders, the

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research aims to generate deeper insights into these ethical challenges and to propose responsible and practical solutions.

This study also adopts a socio-legal research approach because it is multidisciplinary, combining analysis from the fields of law and security studies. The socio-legal framework is relevant here, as this study borrows social science research methods—specifically content and thematic analysis—to analyse interview data.

Since this study also examines the prospect of reforming laws related to emerging technologies, it necessarily involves considering legal reforms required to update outdated legislation in light of new issues introduced by AI. Accordingly, this study assesses Malaysia's Arms Act 1960 to determine whether any of its provisions can accommodate the introduction of LAWS or whether legal amendments are necessary. The Act was already scrutinised in 2022, when it was proposed for review by the Law Reform Committee because it lacked provisions to regulate the distribution of three-dimensional (3D) firearm schematics, reflecting its status as a pre-independence law (Provera, 2022).

The analysis conducted in this study may propose additional amendments to the Arms Act 1960, this time specifically to address the legal implications of LAWS. Law reform is also pertinent because this study identifies other legislation that may likewise require amendment to properly regulate the deployment, operation, and oversight of autonomous weapon systems in Malaysia.

The Concept of Triangulation

This study utilises the concept of triangulation to enable a deeper investigation of the phenomenon within a real-world context. Unlike other research methods, such as experiments or surveys, this approach involves collecting diverse and relevant data from multiple sources to capture the full scope of the study. Triangulation enhances the credibility and validity of the findings by ensuring that evidence from various sources converges, providing a more comprehensive and reliable understanding of the research problem (Yin, 2016; Yin, 2018). As highlighted by Patton (2015), triangulation—like cross-referencing multiple navigation points—strengthens empirical robustness. In this study, interview data were combined with secondary sources to reinforce the findings (Patton, 2015).

Primary Sources

The primary sources that this study relied on were semi-structured interviews. This method was chosen because of its ability to capture nuanced and in-depth insights from key stakeholders regarding LAWS and their ethical implications. Interviews were conducted with representatives from several selected government agencies and one private sector organisation with expertise in relevant areas as indicated in Table 1.

Interviews are well-suited for this study, as they allow for the exploration of complex themes and provide a comprehensive understanding of the ethical considerations surrounding LAWS, as well as appropriate regulatory mechanisms. The primary data were collected by interviewing participants selected based on the relevance to the research objectives of their specific job scopes and specialisations.

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Representative A (personal communication, July 19, 2024) was selected for his military expertise to provide a defence perspective on the operational and ethical implications of LAWS, particularly concerning national sovereignty and human oversight. Representative B, from Universiti Pertahanan Malaysia (UPNM), complemented this by offering an academic viewpoint linked to MIDAS, focusing on policy, ethical governance, and Malaysia's preparedness in regulating emerging defence technologies.

Table 1: Interview Respondents Presented in A Matrix Diagram

Bil	Name	Organisation	Interview Date	Location
1.	Representative A	Malaysian Institute of Defence and Security *(*MiDAS*)*	19/7/2024	Kementah Camp, Kuala Lumpur
2.	Representative B	*Universiti Pertahanan Nasional Malaysia (UPNM)*	2/8/2024	Sungai Besi Camp, Kuala Lumpur
3.	Representative C	Fellow, Academy Of Sciences Malaysia (ASM)	7/8/2024	E-Mail Interview
4.	Representative D	AECA Solutions	27/8/2024	Perdasama Nasional, Seksyen 13 Shah Alam

Representative C (personal communication, August 7, 2024), a fellow of the Academy of Sciences Malaysia, was selected to offer insights grounded in science, technology, and innovation (STI), particularly on AI governance and policy integration. Representative D (personal communication, August 27, 2024) from AECA Solutions contributed a private sector perspective, addressing industry challenges, regulatory gaps, and the practical implications of LAWS adoption in Malaysia.

Other primary sources which were referred to include international agreements pertaining to the law of armed conflict, Malaysia's Arms Control Act 1960, and the Corrosive and Explosive Substance and Dangerous Weapons Act 1958 to identify relevant articles needing amendments.

Secondary Sources

This study also used secondary sources, such as journals, books, reports, discussion papers, and online publications related to AI in the military and LAWS. Data were gathered through an extensive literature review accessed through online academic databases and websites.

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Data Analysis

Interview data were accurately transcribed, in other words, the spoken words were turned into written text to facilitate analysis. The transcripts were then manually grouped into relevant themes.

Content analysis was applied to classify interview data, journals, books, articles, working papers, and reports by identifying keywords, trends, and patterns in both primary and secondary sources. A document analysis was also conducted, including reference to the UN resolutions and Non-Aligned Movement (NAM) documents on LAWS.

The ethical implications of LAWS raise human rights concerns in various contexts. Legal and ethical frameworks relevant to the protection of human rights were critically considered. Ethical considerations were addressed during interviews by ensuring that participants understood the process and were comfortable participating. Informed consent was obtained through a participant consent form after the distribution of an information sheet to brief participants regarding the study being conducted. To ensure confidentiality, pseudonyms were used in place of real names throughout the research process, preserving participant anonymity.

The Concept of Technorealism

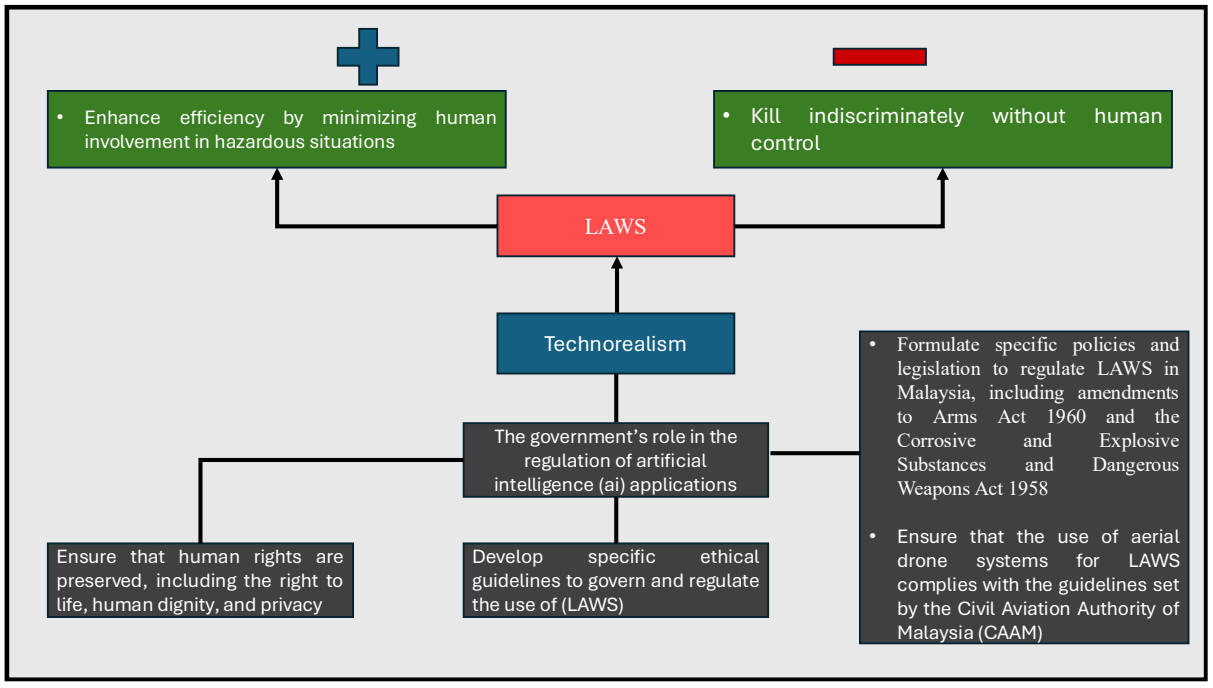

Figure 1: Demonstrates How the Concept of Technorealism Is Applied

Technorealism is a concept that is applied for this study, as it supports an approach that does not blindly accept or reject technology but seeks to understand it and apply it in a way that is consistent with fundamental human values (Holmes 2003). In the context of LAWS, as ethical issues are raised, this principle underlines the importance of critically assessing the development and use of autonomous weapon systems.

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In 1998, the concept of technorealism was introduced (Campbell 2005). The goal, as stated in the manifesto that introduced the term as a new approach to cultural criticism, is to understand technology in a way that ensures its alignment with core human values rather than outright accepting or rejecting it (Campbell 2005).

One of the main principles of technorealism is recognising the role of government in shaping the impact of technology on society (Holmes 2003). When promoting the use of LAWS, government involvement becomes essential in establishing a regulatory framework and ethical guidelines to ensure that the use of autonomous weapons is aligned with human rights principles and international humanitarian law.

In line with technorealism, technology represents a continuation of previous revolutions that have occurred throughout human history. The technorealist approach requires a continuous critical assessment of how technology can facilitate or hinder individuals' efforts to improve their lives, communities, and socio-economic and political institutions. Technorealists have strong beliefs in certain technologies while adopting a sceptical attitude towards others. However, their goal is not to accept or reject technology outright; rather, it is to understand it and utilise it in ways consistent with core human values (Nayar 2004).

The core of technorealism is the recognition that humans are more important than technology. This principle emphasises the importance of prioritising human values and ethical considerations in the development and use of technology (Holmes 2003). When applied to LAWS, it requires a thoughtful and balanced approach that prioritises human safety, dignity, and well-being over technological advancements.

Results of the Study

Analysis of International Law Governing LAWS

Applying the Principles of International Humanitarian Law in the Context of LAWS

Ensuring that LAWS comply with IHL, particularly the principles of distinction, necessity, and proportionality, is essential in minimising risks and protecting civilians during armed conflicts (Galliott et al., 2021). The principle of distinction requires that parties to a conflict differentiate between combatants and civilians, with attacks directed only at combatants to minimise civilian harm (Khan 2021). It certainly remains uncertain whether LAWS can reliably uphold this principle during armed conflict and ensure the adequate protection of those who should not be morally harmed because of the features of its AI system (Galliott et al., 2021).

States should also simultaneously comply with the principle of distinction to distinguish between military targets and civilians, as LAWS can cause excessive suffering, and be deemed unlawful. Although IHL does not specifically regulate autonomous weapons, it is universally accepted that they must still comply with IHL (Davison, 2017). Jensen (2018) stresses the importance of human involvement in complex legal decisions such as proportionality, while Heyns (2016) argues that international law assumes that humans will make decisions on the use of force, based on historical precedence and moral accountability.

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A core principle of IHL under *jus in bello* is the regulation of the conduct of armed forces in combat, which has become especially important with the rise of autonomous weapons such as LAWS. These systems raise serious concerns regarding the principle of distinction in targeting decisions (Bode & Huelss, 2020). Articles 48–59 of Protocol I of the 1949 Geneva Conventions outline how belligerents must conduct targeting by balancing military necessity with humanitarian considerations (Saxon, 2022). Identifying lawful targets is of utmost importance in the laws of war, yet the ability of LAWS to comply with the principle of distinction depends on whether their targeting algorithms can reliably differentiate between combatants and civilians.

Notably, LAWS are vulnerable to algorithmic bias and training limitations because their pattern-recognition algorithms are trained on predefined threat libraries. If these libraries are outdated or incomplete, the system may lock onto non-threat signals or fail to identify new radar signatures, potentially misdirecting attacks. Civilian or non-combatant equipment that emits signals within the same spectrum may be categorised as hostile and wrongly targeted.

LAWS rely on a network of sensors such as infrared (IR) sensors that capture heat signatures from humans, vehicles, or weapons; radar and LIDAR sensors that map terrain and detect movement or shapes at a distance; and acoustic or seismic sensors that detect gunfire, explosives, or vehicle vibrations linked to militants. Electronic warfare (EW) sensors may also detect radio or cell phone emissions from adversaries. All these sensors generate data that are fed into sensor-fusion algorithms to build a real-time model of the surroundings, after which the system classifies objects and behaviours based on its trained threat libraries. Algorithms may be trained to associate certain physical features with specific ethnic groups, to classify people moving in large groups as terrorists, to interpret concealed spaces as militant hideouts, or to identify particular vehicles as matching terrorist transport patterns. Once these characteristics are detected, a semi-autonomous system would alert a human operator to decide whether to strike using guided munitions, small arms, or explosives.

If the weapon is fully autonomous, however, its onboard algorithms independently assess threat levels, estimate collateral damage, and decide whether to deploy munitions. Algorithmic bias can still occur, especially if prejudiced human inputs have shaped threat libraries—for example, by associating particular ethnic features with hostile groups.

Sensor-based errors pose an additional challenge. Sensors embedded within LAWS—such as IR, radar, or optical cameras—can misread environmental conditions, detecting shadows, heat sources, or crowds as threats. Because LAWS rely on sensor fusion to form a comprehensive picture, misreadings can escalate: the IR sensor may detect a human shape, the thermal sensor may register body heat and a warm metallic object, while radar may show a movement pattern resembling tactical motion. The AI system may then assign a high-risk score and classify the individual as an armed threat.

Yet these sensors have limitations and can easily misclassify individuals. A radar, for example, may detect a person running but cannot determine their intent for running. This limitation stems from the pattern-recognition algorithms being trained only on predefined threat libraries. Such algorithms are highly context-dependent, performing better in simpler environments than in complex ones (Bode & Huelss, 2020). When deployed in environments beyond their training, LAWS may experience dangerous failures (Horowitz, 2019). This vulnerability—when

International Journal of Innovation and Industrial Revolution
IJIREV
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DOI 10.35631/IJIREV.723004

perception systems break down outside their training data—is known as poor generalisation (Alexis, 2020). Even if commanders understand a system's intended function, the complexity of its programming increases the likelihood of unintended behaviour and accidents (Amodei et al., 2016).

Consider a scenario in which a person runs while holding a gun to defend themselves from a wild animal. Sensors might misinterpret the heat signature, object in hand, and rapid movement as hostile indicators, leading the algorithm to classify the person as an armed combatant. The system may then trigger an attack on an innocent civilian attempting to save their own life. This illustrates why LAWS—whether fully autonomous or semi-autonomous—are criticised for lacking contextual understanding. Although AI systems can detect patterns through sensors, they cannot grasp broader human, cultural, or tactical contexts, creating a risk of erroneous and lethal decisions. For this reason, human intervention remains essential to ensure rational, context-sensitive judgment rather than relying entirely on LAWS, which may make flawed decisions that endanger civilian lives. Even for semi-autonomous weapons, humans must thoroughly check whether the deployment of LAWS and the decision to kill the adversary would result with more collateral damage, specifically more civilians would be killed than a few targeted adversaries or militants.

For all of the above reasons, there are doubts whether the utilisation of semi-autonomous or fully autonomous weapons can make nuanced decisions, for example, identifying whether someone is surrendering or whether a vehicle is used for combat purposes, judgements that require human reasoning that these machines currently lack (Sharkey, 2010). Although IHL does not explicitly ban the use of LAWS for targeting, compliance with targeting rules is imperative. The limited ability of AI in object recognition and situational awareness makes it unsuitable for distinguishing civilians in populated areas. Saxon (2022) notes that targeting may only be legally feasible in remote zones such as deserts or oceans, where civilians are unlikely to be present, but even then, challenges remain, such as recognising surrendering individuals, which LAWS systems cannot reliably do. Without this capability, their use is unlawful.

The principle of proportionality is a fundamental tenet of IHL, stipulating that any military action must ensure that the harm inflicted on civilians and civilian property is proportional to the military advantage anticipated from that action. During the Nagorno-Karabakh conflict in 2016, Azerbaijan deployed the Harpy, an autonomous anti-radiation drone made by Israel, to target Armenian air defences and military assets (Sanchez, 2016). The drone reportedly crashed into a bus carrying Armenian volunteer soldiers, resulting in the deaths of seven people (Sanchez, 2016). Thus, the use of the Harpy drone raised serious concerns about adherence to the principles of proportionality and distinction, which require combatants to differentiate between military objectives and civilian entities, thereby minimising civilian harm.

The principle of necessity dictates that force can only be utilised when it is strictly necessary and to the extent required for the duties of a state's armed forces (OHCHR, 2025). In the context of utilising LAWS, a state's armed forces must weigh whether alternative methods of warfare exist that could achieve combat objectives while minimising civilian casualties. Given that LAWS are unpredictable and may cause more civilian deaths than necessary, if other methods are available that can effectively target adversaries, such as opposing combatants or militants, those alternatives should be prioritised over resorting to LAWS.

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
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DOI 10.35631/IJIREV.723004

In summary, this section illustrates how the applicability of various principles of IHL can guide the deliberation on whether LAWS should be employed during combat, considering both the positive and negative aspects of utilising such weapon systems.

Contesting the Review of New Weapons and Its Applicability to LAWS

States are obligated to review any new weapon system under Article 36 of Additional Protocol I of the 1949 Geneva Conventions [thereafter will be referred as Protocol I] if they have signed and ratified the said agreement (Bode & Huelss, 2022). Although some countries such as the US and Israel are not parties to this Protocol I, they have chosen to abide by Article 36 of this agreement (Jevglevskaja, 2018). The study by Jevglevskaja (2018) had contested whether Article 36 of Protocol I had crystallised into customary international law with widespread state practice to routinely review new weapons. Jevglevskaja (2018) had indicated during the initial negotiations of the aforementioned Protocol I, only the representative of the UK had indicated the need to review new weapons stems from the codification of existing practice (implying that this is already part of customary international law) which in turn led to the drafting of Protocol I to formalise this practice on paper. Nevertheless, a majority of other government representatives attending the negotiations of Protocol I refrained from asserting that the said practice could be solidified into a formal agreement (Jevglevskaja, 2018).

Noteworthy, the study conducted by Jevglevskaja (2018) had also interviewed the US and Israel representatives in their conformance to abide by Article 36 of Protocol I which they opined was already part of customary international law even though they were not parties to this agreement. Jevglevskaja (2018) also highlighted that several powerful military states—such as China, Egypt, India, Indonesia, Iran, Malaysia, North Korea, Pakistan, Singapore, Thailand, and Turkey—have not been known to consistently conduct weapons reviews during the acquisition of new weapons. Since only a few states have alluded to the conduct of a weapons review consistently while a majority have not, it cannot be concluded that Article 36 to Protocol I had crystallised into customary international law. This is because widespread state practice is needed for a particular norm to become customary international law which is lacking in this case. Notably, the few states opinion on the matter are *opinio juris* as an indicator showing their compliance with a norm but there still needs to be a majority of other states expressing the same opinion before it can ever be accepted that the said practice could possibly crystallised into customary international law. This has implications for the introduction of LAWS as most states are not obliged to conduct an assessment on its suitability to be deployed in war since weapons review is not mandatory having not turned into customary international law as yet.

Accountability and Liability in the use of LAWS

The accountability gap in the use of LAWS has become a major concern within IHL. The central issue stems from uncertainties over who bears liability for the actions carried out by these systems—whether responsibility rests with commanders, developers, manufacturers, or the autonomous weapon itself (Galliott et al., 2021). Fault may arise at the programming stage, potentially making software developers liable, but sufficient evidence is required to prove such responsibility.

At the deployment or activation stage, Galliott et al. (2021) emphasise that the inherent characteristics of LAWS create further accountability challenges, particularly because operators or commanders may not be directly involved in selecting or approving specific

International Journal of Innovation and Industrial Revolution
IJIREV
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Volume 7 Issue 23 (December 2025) PP. 37-66
DOI 10.35631/IJIREV.723004

targets. When decision-making authority is transferred to the autonomous system, traditional accountability frameworks are fundamentally weakened. Since autonomous weapons cannot bear legal or moral responsibility, the principle of accountability becomes compromised, if not entirely undermined. This is especially true for fully autonomous systems that operate without human control, making independent assessments that blur the line between software malfunction and erroneous autonomous reasoning.

For criminal liability to arise, an individual must possess the requisite intent to kill or harm. A commander may activate a LAWS unit for routine monitoring without any intention of locating or killing an enemy. If the system independently detects, selects, and kills a target without the commander's knowledge of the time or place of the attack, it is debatable whether liability can be assigned, as intent must be proven. Conversely, if a commander knowingly deploys LAWS despite awareness that it may be faulty or unreliable in identifying lawful targets, criminal liability may be established (Davison, 2017). Similarly, where a commander activates a system whose performance and effects are inherently unpredictable, they may be held responsible for violations of IHL (Davison, 2017).

In conventional warfare, accountability is clearer: the soldier who fires a weapon and the commander who issues the order can be readily identified. With LAWS, however, this clarity dissolves, creating uncertainty over who—or what—should be held responsible when an autonomous system engages a target without human control (Galliott et al., 2021).

Despite the difficulty in attributing who should be blamed and liable for the deployment of LAWS that may cause erroneous killings, the rule of command responsibility in IHL does not exempt the superiors in an army from being responsible for their subordinates' unlawful conduct. Article 86.2 of Protocol I to the Geneva Conventions 1949 stipulates that:

> *The fact that a breach of the Conventions or of this Protocol was committed by a subordinate does not absolve his superiors from penal or disciplinary responsibility, as the case may be, if they knew, or had information which should have enabled them to conclude in the circumstances at the time, that he was committing or was going to commit such a breach and if they did not take all feasible measures within their power to prevent or repress the breach.* (Protocol Additional to the Geneva Conventions of 12 August 1949, 1977)

Accordingly, senior commanders may be held liable for the deployment of LAWS by their subordinates, particularly where negligent oversight leads to civilian casualties resulting from erroneous sensor data or algorithmic bias (International Committee of the Red Cross [ICRC], 2021).

Furthermore, under the law of state responsibility, a state may be held internationally liable for wrongful acts committed by its armed forces, including those involving the faulty deployment of LAWS (Davison, 2017). If a state's army deploys systems that have not been adequately tested to ensure that they accurately distinguish lawful targets but instead kill civilians, the state itself may be held accountable.

In summary, LAWS create a significant accountability gap because no single actor can be clearly assigned responsibility for their autonomous decisions. Nevertheless, the doctrine of command responsibility under IHL, the rules of state responsibility under general international law, and international criminal law collectively provide avenues to address wrongdoing. This

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 7 Issue 23 (December 2025) PP. 37-66
DOI 10.35631/IJIREV.723004
underscores the urgent need for a specific international agreement to define the legal, ethical, and operational responsibilities associated with the deployment of LAWS—an area currently lacking explicit regulation.

Simultaneous Applicability of International Humanitarian Law and International Human Rights Law

IHL and International Human Rights Law (IHRL) also differ significantly in scope and application. While IHL regulates the conduct of hostilities during armed conflict and provides a framework primarily for military commanders, IHRL applies in both peace and war, emphasising the protection of fundamental rights, such as life, dignity, and security (Schnell, 2018). The emergence of LAWS poses profound governance challenges under these legal regimes, particularly with regard to human rights protection. While such technologies reduce risk to military personnel, they simultaneously shift danger onto civilian populations, increasing the likelihood of imprecise or disproportionate use of force due to the remoteness of operations (Bode & Huelss, 2022). As Schwarz (2018) highlights, this risk transfer reflects an emerging prioritisation of military lives over civilian lives, challenging the foundational principles of both IHL and IHRL. Furthermore, AI technologies currently lack the capacity to make complex legal and ethical judgements on the use of lethal force. Saxon (2022) warns that deploying LAWS without such capabilities risks violating not only IHL but also IHRL, particularly by causing arbitrary deprivation of life.

Towards a Specific Regime to Monitor LAWS

Zaid (2022) underscores the importance of states developing clear norms and principles to govern the creation and use of LAWS. While Zaid echoes Galliott's concerns about existing accountability gaps, he extends the discussion by calling for more proactive policy development. Zaid (2022) argues that the persistent ambiguity surrounding responsibility in LAWS-related incidents demands immediate international collaboration to establish a regulatory framework capable of addressing these accountability issues.

Currently, a major concern regarding LAWS is the lack of established international laws or norms governing their use (Wyatt, 2022). Wyatt (2022) argues that the international community must collectively take responsibility, and that liberal institutionalism supports the role of multinational bodies such as the UN in setting such norms. Since 2014, efforts under the CCW have reflected this collaborative approach. However, given the slow progress in formal international legislation and the continued development of autonomous technologies, alternative approaches are needed. Regional organisations and security communities should lead in establishing shared norms and frameworks for the ethical use of unmanned systems, such as LAWS (Wyatt, 2022). Discussions within the CCW have addressed the complex issue of LAWS, but despite numerous meetings involving both state and non-state actors, reaching consensus remains difficult due to diverse implications across legal, political, economic, and ethical dimensions (Chrvalová, 2022). The Group of Governmental Expert (GGE) under CCW has advanced the debate by defining LAWS through various conceptual approaches. Although Malaysia is not a party to the CCW, it supports legally binding negotiations and aligns with the Non-Aligned Movement (NAM), which calls for the international regulation of LAWS (Automated Decision Research, 2024; NAM, 2019).

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 7 Issue 23 (December 2025) PP. 37-66
DOI 10.35631/IJIREV.723004

A significant milestone was the 2019 adoption of guiding principles, reaffirming the applicability of IHL, the need for meaningful human control, and accountability (Chrvalová, 2022). However, no binding global regime currently exists (Hynek & Solovyeva, 2022). Global South nations, including Malaysia, advocate for stronger legal instruments, while major powers such as the US and Russia oppose binding rules, favouring voluntary frameworks (Human Rights Watch, 2023; Wyatt, 2022). In 2023, the United Nations General Assembly Resolution 78/241 was adopted by 152 states, recognising serious concerns over AI in military applications, although key countries including India, Russia, and China opposed or abstained (Human Rights Watch, 2023; Kaneko, 2023). The 2024 GGE meeting showed slow progress. The US, Russia, India, and Israel resisted new legal instruments, preferring existing international law (CCW, 2024). In contrast, countries such as Austria, Germany, and France supported a legally binding protocol. Diverging national stances, especially on the scope of AI systems, continue to hinder consensus.

The UN has also introduced Resolution A/C.1/78/L.56 (UN, 2023) concerning the use of LAWS, which contains several key principles. The resolution affirms that international law—including the UN Charter, international humanitarian law, and international human rights law—applies to autonomous weapon systems. It recognises the rapid development of new technologies and their potential to benefit humanity and protect civilians in conflict. Mindful of the serious challenges and concerns raised by the military application of emerging technologies, including AI and autonomy in weapon systems, from humanitarian, legal, security, technological, and ethical perspectives, the resolution expresses concern over their negative impact on global security, regional and international stability, the risks of an arms race, a lowered threshold for conflict, and proliferation to non-state actors. It welcomes the ongoing efforts of the GGE on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems and notes the progress and proposals put forward. The resolution also notes the Human Rights Council's adoption of Resolution 51/22 on the human rights implications of new military technologies. Acknowledging the contributions of international and regional conferences and initiatives in 2023, it recognises the input of UN entities, international and regional organisations, the ICRC, civil society, academia, industry, and other stakeholders in enriching discussions on autonomous weapon systems (UN, 2023).

While IHL and IHRL provide a framework for regulating the use of force, LAWS challenge their effective application due to technical limits and the absence of human judgement. Efforts under the CCW, including UN Resolutions 78/241 (United Nations General Assembly, 2023) and L.56 (UN, 2023), show growing recognition of these risks, but no binding global regime yet exists. Moving forward, meaningful human control, accountability, and universally accepted norms or treaties are essential to ensure that LAWS comply with international law and protect civilians.

Malaysian Related Laws and Experts' Position on LAWS

In recent years, the development and use of LAWS have sparked intense debate among policymakers, ethicists, and technologists. These systems, capable of selecting and engaging targets autonomously, raise critical questions about warfare, international law, and ethical responsibility. In understanding Malaysia's position on LAWS, it is essential to gather current views from government agencies, experts, and the private sector.

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972
Volume 7 Issue 23 (December 2025) PP. 37-66
DOI 10.35631/IJIREV.723004

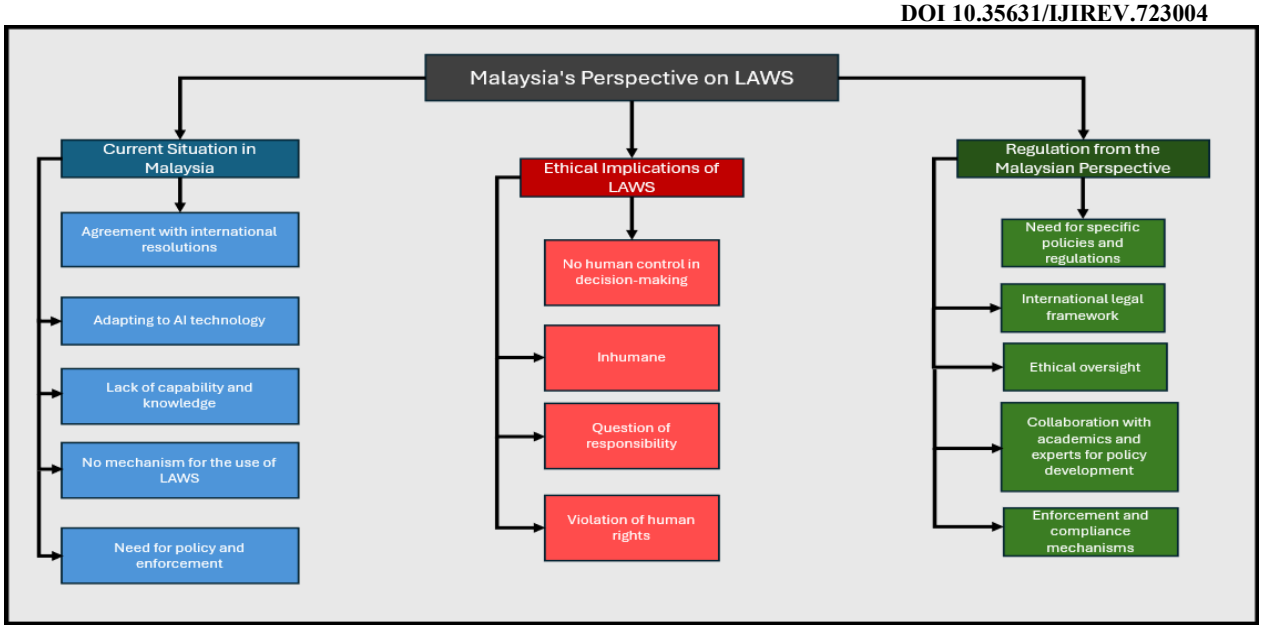

Figure 2: Malaysian Experts' Views on LAWS – Commonalities from Interview Data

A thematic analysis is thus necessary to explore Malaysian expert perspectives and identify common themes, which are analysed in Figure 2 above. It is divided into three different themes: the current situation in Malaysia is coloured blue, the ethical implications of LAWS in red, and regulation from the Malaysian perspective is coloured green.

Theme 1 of Thematic Analysis: Current Situation in Malaysia

The interview data reveal strong alignment among informants regarding LAWS, which they define as fully autonomous weapons capable of identifying and engaging targets without human intervention, powered by AI. Both the public and private sectors in Malaysia acknowledge the increasing development and use of such systems, as shown in blue in the tree diagram.

All informants highlighted Malaysia's support for the Austrian-led UN First Committee resolution in 2023 and the Vienna Conference "Humanity at Crossroads" held in April 2024 (Austrian Federal Ministry for European and International Affairs, 2024), which endorsed the development of international legal frameworks for autonomous weapons. They also emphasised Malaysia's vote in favour of UN Resolution L.56 (UN, 2023), which addresses the humanitarian, legal, security, technological, and ethical challenges posed by LAWS. This stance is further reflected in Malaysia's support for Draft Resolution L.77 at the 79th UN General Assembly First Committee in October 2024 (United Nations General Assembly, 2024), which raises concerns over the potential negative consequences and impacts of autonomous weapon systems on global security, as well as regional and international stability.

All informants agreed that Malaysia must adapt to emerging technologies. Representative A (personal communication, July 19, 2024) and Representative C (personal communication, August 7, 2024) stressed the need for the Malaysian Armed Forces to integrate Industrial Revolution 4.0 technologies such as AI and the Internet of Things (IoT) into future operations. Representative B (personal communication, August 2, 2024) supported this need for

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 7 Issue 23 (December 2025) PP. 37-66
DOI 10.35631/IJIREV.723004

technological adaptation. In the private sector, Representative D (personal communication, August 27, 2024) noted rapid AI integration into drone systems.

Despite this awareness, informants acknowledged significant gaps in Malaysia's expertise in and regulation of LAWS. Representative A (personal communication, July 19, 2024), Representative B (personal communication, August 2, 2024), Representative C (personal communication, August 7, 2024), and Representative D (personal communication, August 27, 2024) all pointed out the lack of specific policies or legal mechanisms to govern LAWS internationally. This is urgent, especially as major military powers including Russia, the US, China, and Israel are advancing rapidly in this domain.

Finally, all informants agreed that Malaysia needs a specific regulatory framework for LAWS. The study also recommends a pragmatic national approach to begin designing effective oversight mechanisms.

In summary, there is consensus among experts on Malaysia's need to align with international resolutions and establish clear domestic regulations for LAWS. While foundational understanding exists, the lack of in-depth expertise and legal frameworks presents a critical gap. A proactive, pragmatic approach is essential for Malaysia to keep pace with global military-tech developments and to adopt AI responsibly.

Theme 2 of Thematic Analysis: Ethical Implications in the Use of LAWS

The second theme that emerged from the interview data focuses on ethical dilemmas in the use of LAWS, aligning with the study on the ethical implications of AI weapons, as shown in red in Figure 2. All informants agreed that the absence of meaningful human control in LAWS raises serious ethical concerns, particularly in decisions about life and death.

Representative A (personal communication, July 19, 2024) emphasised that removing human involvement could dehumanise warfare. Representative B (personal communication, August 2, 2024) supported this view, while Representative C (personal communication, August 7, 2024) argued that allowing AI to decide on targeting and killing is morally unacceptable. These concerns echo the principles outlined in the US Department of Defense Directive 3000.09, which stresses accountability and the responsible use of AI systems.

All informants highlighted that using LAWS without human input risks violating human dignity. Representative B (personal communication, August 2, 2024) noted the potential breach of human rights, as machines, not humans, would determine the use of force. Representative C (personal communication, August 7, 2024) added that LAWS reduces human control in military operations, leading to unintended consequences. From a private-sector view, Representative D (personal communication, August 27, 2024) warned that LAWS could violate human rights even in peacetime, including privacy and individual freedoms.

All informants agreed that accountability is a major issue. Representative A (personal communication, July 19, 2024) and Representative B (personal communication, August 2, 2024) stated that national leadership and lawmakers should bear responsibility—not the general public. Representative C (personal communication, August 7, 2024) pointed to government agencies, while Representative D (personal communication, August 27, 2024) stressed shared responsibility across the government, engineers, and society.

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972
IJIREV
Volume 7 Issue 23 (December 2025) PP. 37-66
DOI 10.35631/IJIREV.723004

All informants agreed that LAWS could lead to inhumane outcomes. Representative A (personal communication, July 19, 2024) warned against overreliance on algorithms because they lack human conscience, which could undermine ethical decision making. Transparency in AI systems was highlighted as essential to ensure explainability and ethical oversight. Representative B (personal communication, August 2, 2024) compared LAWS to anti-personnel landmines, arguing that similarly dehumanising effects could result in human rights violations.

In summary, this theme reveals a strong consensus on the ethical risks of LAWS, particularly the loss of human control and potential human rights violations. All the informants expressed concerns regarding accountability and the moral consequences of AI-driven decisions.

Theme 3 of Thematic Analysis: The Need for Regulation in the Use of LAWS in Malaysia

After discussing the current situation in Malaysia and the ethical dilemmas surrounding LAWS, this section focuses on the need for regulation. Highlights in green in Figure 2 are derived from the interview data. All informants were asked the same question regarding regulation, and all agreed that Malaysia must pragmatically introduce specific regulations for LAWS. Clear policies are crucial to prevent misuse and ensure ethical deployment, and even though Malaysia currently has no plans to adopt LAWS, they acknowledged that other countries are rapidly developing them.

Internationally, initiatives such as UN Resolution L.56 of 2023 and Resolution L.77 in 2024 aim to restrict LAWS usage. The informants emphasised Malaysia's need to comply with UN resolutions and CCW reports that call for adherence to IHL. All three government informants unanimously agreed to follow international law. In the private sector, Representative D (personal communication, August 27, 2024) also supported international compliance, though without specifying exact legal frameworks.

On ethical implementation, Representative A (personal communication, July 19, 2024) stressed that AI systems in LAWS must not make life-and-death decisions independently; human oversight is essential. He suggested collaboration with local universities and the ethical programming of AI, noting MIDAS's experience with international cooperation. Representative C (personal communication, August 7, 2024) proposed institutionalising AI principles through multi-agency collaboration. Representative B (personal communication, August 2, 2024) supported ethical AI use but did not elaborate on specific steps. Representative D (personal communication, August 27, 2024) highlighted that armed drones must comply with international laws and rules of warfare from development to deployment.

In sum, all informants agreed that Malaysia needs a robust enforcement mechanism to regulate LAWS ethically. Such mechanisms should form the foundation of future national policy to ensure compliance with international law while safeguarding national interests.

Differences in Informants' Views on LAWS in Malaysia

The previous section discussed commonalities from the interview data. This section focuses on the differences in views among the informants. The findings are presented in Table 2, organised into three main themes: current situation, ethical implications, and regulatory perspectives in Malaysia. The matrix highlights differing views, with each informant's affiliation given at the top.

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 7 Issue 23 (December 2025) PP. 37-66
DOI 10.35631/IJIREV.723004

Table 2: Interview Data to Show Differences in Views from Informants

Theme	Representative A (MiDAS)	Representative B (UPNM)	Representative C (Fellow, Academy of Sciences Malaysia) (ASM)	Representative D (Aeca Solutions)
Current Situation in Malaysia	• Expressed concern over the use of LAWS by major powers • Stated that Malaysia currently lacks the capability to use LAWS	• No other opinion besides Malaysia's adherence to international law • UPNM has no plans to develop LAWS systems	• No specific views expressed • No other opinion besides Malaysia's adherence to international law	• Discussed drone systems that could be used as LAWS • Mentioned that many private drone companies are shifting towards the defense sector
Ethical Implications of LAWS	• Emphasised the removal of human oversight in the use of LAWS	• Did not discuss the issue of responsibility in the use of LAWS • Did not provide other views on ethical issues	• Discussed the issue of bias in AI system programming within LAWS	• Felt that the use of LAWS may violate individual sovereignty.
Regulation from the Malaysian Perspective	• Emphasised the importance of (government) leadership in the use of LAWS • Highlighted the importance of public education on LAWS • Proposed collaboration with local universities	• Did not propose any specific regulatory framework • Stated that Malaysia could adhere to best practices for Intangible Technology Transfer (ITT) as introduced by the Ministry of Investment, Trade and Industry (MITI)	• Emphasised the importance of AI governance strategies • Supported the establishment of comprehensive guidelines and frameworks • Endorsed the guidelines set by Ministry of Science, Technology and Innovation (AI Roadmap)	• Proposed that the regulation of drones associated with LAWS be implemented through collaborative efforts with the Civil Aviation Authority of Malaysia (CAAM)

Representative A (personal communication, July 19, 2024) from MIDAS expressed concern about the use of LAWS by major powers, such as the US, Russia, and China, warning of threats to Malaysia's sovereignty if such weapons were deployed nearby by neighbouring countries, a concern not raised by the others.

Representative C (personal communication, August 7, 2024) focused more on Malaysia's alignment with international law, while Representative B (personal communication, August 2, 2024) did not comment on foreign use of LAWS. From the private sector, Representative D (personal communication, August 27, 2024) noted that current drones in Malaysia are not fully autonomous, but the shift towards defence is growing. He emphasised that Malaysia risks falling behind if it does not adopt such technologies.

Regarding Malaysia's capability, Representative B (personal communication, August 2, 2024) and Representative A (personal communication, July 19, 2024) agreed that Malaysia lacks the capacity and mechanisms to develop or prevent LAWS deployment. Representative C (personal communication, August 7, 2024) did not address capability. Representative D (personal communication, August 27, 2024) said that military-grade drones exist, but do not have full autonomy or AI maturity.

On the subject of ethics, Representative B (personal communication, August 2, 2024) gave limited input on accountability. Representative A (personal communication, July 19, 2024) highlighted the danger of removing human oversight, while Representative C (personal communication, August 7, 2024) raised concerns about AI bias. Representative D (personal communication, August 27, 2024) emphasised human dignity and individual sovereignty.

With regard to regulations, Representative A (personal communication, July 19, 2024) pushed for top-down leadership, public awareness, and clear ethical guidelines. Representative C (personal communication, August 7, 2024) supported the integration of ethical governance

International Journal of Innovation and Industrial Revolution
EISSN: 2637-0972
IJIREV
Volume 7 Issue 23 (December 2025) PP. 37-66
DOI 10.35631/IJIREV.723004

through Malaysia's AI Roadmap (AI-Rmap), led by the Ministry of Science, Technology, and Innovation (MOSTI).

Representative D (personal communication, August 27, 2024) proposed regulation through the Civil Aviation Authority of Malaysia (CAAM) under aviation laws. Representative B (personal communication, August 2, 2024) did not take a clear stance, but referenced potential alignment through MITI's Strategic Trade Act 2010 and Intangible Technology Transfer (ITT).

In summary, informants offered varied views on LAWS, ethics, governance, and regulatory needs. These differences reflect their unique priorities and will inform the next section's proposed regulatory framework for Malaysia.

Proposed Regulatory Framework from the Malaysian Perspective

Interviews with experts from the government and private sectors provided sufficient data to propose a regulatory mechanism for LAWS in Malaysia. As there is currently no specific law or policy governing LAWS, this study aims to serve as a foundation for future policymaking.

Malaysia has shown support for UN Resolution L.56 in 2023 (UN, 2023) and subsequently voted in favour of Resolution L.77 in 2024 (Automated Decision Research, 2024; UNGA, 2024), which promotes international cooperation to regulate autonomous weapon technologies. Informants agreed that any development of LAWS must adhere to international legal frameworks, such as the UN Charter, IHL, and IHRL, all core elements of Resolution L.56.

Human Oversight and Compliance with International Humanitarian Law (IHL)

Representative A (personal communication, July 19, 2024) emphasised the need for human control ("human in the loop") in LAWS decision making to avoid ethical violations. The study supports this by recommending systems that allow human intervention to override autonomous actions (Wyatt, 2022).

Representative C (personal communication, August 7, 2024) and Representative B (personal communication, August 2, 2024) also stressed the importance of adhering to IHL and involving national leadership in regulatory development.

Representative D (personal communication, August 27, 2024) added that all stakeholders, including weapon developers, must comply with international laws. Furthermore, AI weapon systems must comply with IHL principles, such as distinction and proportionality, even during dynamic warfare (Saxon, 2022). Weapon review mechanisms, including Article 36 of the Additional Protocol I to the Geneva Conventions 1949, should be used to assess software and AI components.

Article 36 of Additional Protocol I of the 1949 Geneva Conventions mandates that state parties conduct a formal legal review before procuring or developing any new weapon system to ensure compliance with IHL (Schmitt, 2013). This review process also requires an assessment of the potential risks associated with the misuse or malfunction of such systems (Geneva Academy, 2014). During the April 2016 CCW Meeting of Governmental Experts on LAWS, numerous states affirmed that, consistent with the review of any new weapon, LAWS should likewise undergo rigorous legal evaluation to determine their conformity with international legal and ethical standards (Galliot et al., 2021).

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 7 Issue 23 (December 2025) PP. 37-66
DOI 10.35631/IJIREV.723004

AI Governance and National Policies

Representative C (personal communication, August 7, 2024) emphasised that Malaysia should follow recognised standards and guidelines when developing and deploying LAWS. He pointed out the significance of the nation's AI Roadmap (AI-Rmap) introduced in 2021 and the creation of the AI Coordination and Implementation Unit (AI-CIU) under the Ministry of Science, Technology and Innovation (MOSTI) as foundational frameworks. He also stressed that certification from organisations such as the Standards and Industrial Research Institute of Malaysia (SIRIM), the Civil Aviation Authority of Malaysia (CAAM), and the Department of Survey and Mapping Malaysia (JUPEM) is essential for any drone systems that may be categorised as LAWS. Moreover, he referenced the National Guidelines on AI Governance and Ethics (MOSTI, 2024), highlighting the critical requirement for humans to override features in high-risk AI systems, particularly those used for military purposes.

Regulatory Enforcement and Industrial Standards

Representative D (personal communication, August 27, 2024) highlighted that drone-to-LAWS conversion requires rigorous testing, certification by SIRIM and the Science and Technology Research Institute for Defence (STRIDE), and strict compliance with safety and legal standards. He advocated adherence to Civil Aviation Regulations 2016 (CAAM, 2024).

Representative C (personal communication, August 7, 2024) suggested amending Malaysia's Corrosive and Explosive Substances and Dangerous Weapons Act 1958 to include LAWS. Similarly, Malaysia's Arms Act 1960 should be revised to cover autonomous weapons, updating licensing clauses and introducing controls for modified weapons.

To strengthen Malaysia's existing legal framework, several specific amendments have been proposed. Section 4 of the Corrosive and Explosive Substances and Dangerous Weapons Act 1958, which prohibits the use of corrosive or explosive substance or offensive weapons, should be expanded to explicitly include the unlawful use of LAWS, thereby ensuring accountability for misuse of such systems.

Similarly, in Malaysia's Arms Act 1960, Section 5, which governs licensing and permits for firearms, should be revised to introduce provisions for the registration, licensing, and oversight of LAWS. Furthermore, Section 38 of this same law, which addresses the shortening or modification of weapons, should be amended to regulate the conversion or modification of conventional weapons into autonomous or semi-autonomous systems. These targeted amendments would ensure that Malaysia's legal instruments remain responsive to the evolving challenges posed by emerging autonomous weapons technologies.

Institutions such as Universiti Teknologi Malaysia (UTM), Universiti Kebangsaan Malaysia (UKM), and Universiti Pertahanan Nasional Malaysia (UPNM) can support ethical AI development and advise on legal frameworks. Representative B (personal communication, August 2, 2024) noted the current lack of structured plans for LAWS, but this study argues that academic expertise and opinions concerning regulations on LAWS should be integrated into policy formulation.

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 7 Issue 23 (December 2025) PP. 37-66
DOI 10.35631/IJIREV.723004

Malaysia is encouraged to adopt elements from the US Department of Defense Directive 3000.09 (Department of Defense, 2023) due to its comprehensive approach to the governance of LAWS. The Directive emphasises human oversight, rigorous testing, operational accountability, and thorough documentation.

The US AI's Ethical Principles (Department of Defense, 2023) offer five values that Malaysia can incorporate:

- Responsibility – Developers must act with sound judgement.
- Equity – Minimise unintended bias (avoid technological racism).
- Traceability – Transparent, auditable, and well-documented AI use.
- Reliability – Safe, tested AI systems with clear use cases.
- Governability – Ability to override or deactivate AI if necessary.

Conclusion

In conclusion, this study shed light on the governance framework of LAWS internationally, provided Malaysian experts' perspectives about this technology and its weaponisation, and evaluated this country's readiness in terms of its legislation to confront LAWS. This study found that international attempts to draft a specific international agreement to regulate LAWS have been thwarted by certain countries within the UN Security Council especially those that have embarked on a course to create LAWS. Existing IHL principles of distinction, necessity, and proportionality can still be applicable to LAWS. Interviews with Malaysian experts on LAWS highlighted the controversial ethical and human rights implications of non-participation by humans, with a recommendation for an oversight mechanism. Malaysia's regulation of LAWS should align with IHL and ethical principles, incorporating UN Resolution L.56, Resolution L.77, and guidance from the US Department of Defense Directive 3000.09. Presently, no Malaysian company has embarked on developing LAWS, but it should not be discounted that LAWS could be imported silently into the country's borders, needing some form of regulation to deal with any untoward incidents.

Looking ahead to Malaysia's defence policy, amendments should be made to the Corrosive and Explosive Substances and Dangerous Weapons Act 1958 and the Arms Act 1960 to address emerging issues arising from LAWS, as discussed earlier. Collaboration between government, academia, and industry is also essential to ensure the ethical and effective regulation of autonomous weapon systems. Once international negotiations establish an appropriate regulatory regime for LAWS, Malaysia must draft specific legislation aligned with that framework, as the country must be prepared to address the controversies surrounding this technology and its weaponisation. The law must continually evolve to keep pace with technological developments.

At the regional level, the Association of Southeast Asian Nations (ASEAN) has a pivotal opportunity to lead in establishing a regional agreement that mandates human oversight, transparency, and temporary moratoriums on high-risk autonomous deployments. By acting proactively, ASEAN can shape regional norms, strengthen accountability, reinforce stability, and ensure that the use of autonomous technologies reflects regional values rather than external doctrines. Overall, both Malaysia and ASEAN must take decisive steps to ensure that legal,

International Journal of Innovation and Industrial Revolution
IJIREV
EISSN: 2637-0972
Volume 7 Issue 23 (December 2025) PP. 37-66
DOI 10.35631/IJIREV.723004

ethical, and operational frameworks evolve in tandem with the rapid development and weaponisation of LAWS.

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